

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
18 April 2002 (18.04.2002)

PCT

(10) International Publication Number
WO 02/31738 A1(51) International Patent Classification⁷: G06F 17/60

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(21) International Application Number: PCT/US01/42618

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(22) International Filing Date: 11 October 2001 (11.10.2001)

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/239,860 11 October 2000 (11.10.2000) US

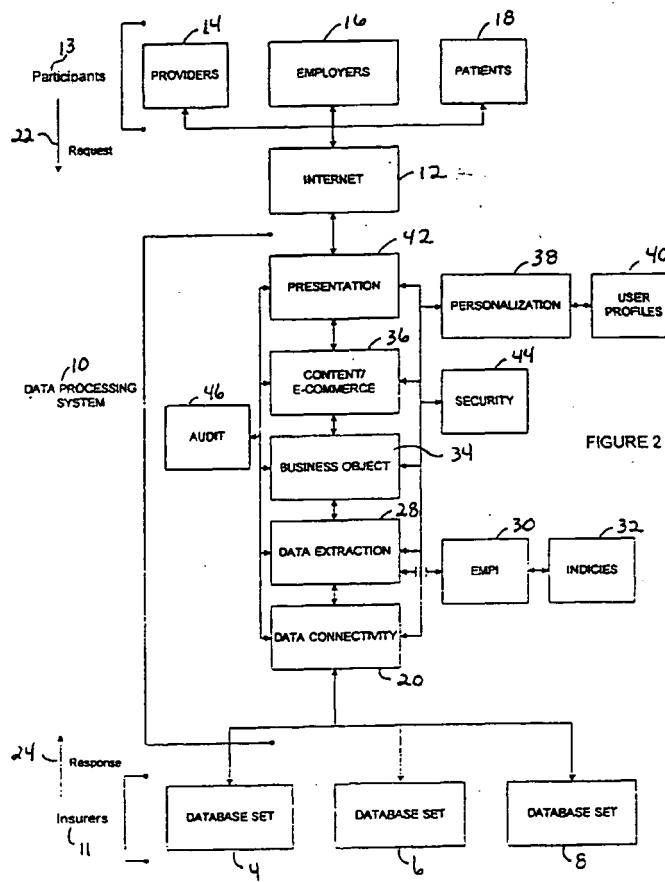
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

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(54) Title: SYSTEM FOR COMMUNICATION OF HEALTH CARE DATA



(57) Abstract: An apparatus for communicating health care data from a sender to a receiver is provided. The apparatus has a first computer system (10), a second computer system, and a rules engine. The first computer system (10) has health care data stored therein. The second computer system is in operable communication with, and is configured to extract the health care data from the first computer system (10). The rules engine normalizes the extracted health care data to a predefined format. The rules engine defines a plurality of health care data fields in the predefined format, as well as a plurality of relationships between fields of normalized data.

WO 02/31738 A1



IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *with international search report*

SYSTEM FOR COMMUNICATION OF HEALTH CARE DATA

RELATED APPLICATION

5 The present application is related to and claims priority to U.S. Provisional Patent Application Serial No. 60/239,860, filed October 11, 2000, entitled "Apparatus and Method for Establishing Connectivity." To the extent not included below, the subject matter disclosed in this application is hereby expressly incorporated into the present application.

10

FIELD OF THE INVENTION

15 The present invention relates generally to a computerized system that establishes connectivity between interested parties in the health care industry for the administration of health care services. More particularly, the present invention relates to a system for the normalization of health care data of various formats and exchanging the data in normalized form between insurers and participants, such as providers, patients, and employers.

BACKGROUND AND SUMMARY

20 Health care can be defined as an information industry; most of the time and money spent in procuring and delivering health care is spent creating, retrieving, or using information. Expenditures on health care information technology support, for example, have increased from about one billion dollars in 1990 to a projected \$20 billion in 2000. Yet, even with these investments, it is believed that almost half of all 25 current health care expenditures continue to be for non-patient care activities; a major share of which is for non-automated information support.

30 Resources having to be directed to non-patient care activities have been endemic in the health care industry since the 1960's. During the 1990's, however, with the demise of Medicare Cost Reimbursement and the rise of managed care, there has been a major shift in attitude and focus among both physicians and patients. New rules now govern the delivery of medical care and the payment for

such care. Whether via preferred provider arrangements, capitation arrangements of endless variety, case management, or "best practice" enforcement, determining what care is allowed, what will be paid by whom, and making sure that the appropriate information is submitted to ensure that the process works are now consuming a major 5 share of both time and financial resources of insurers, providers, and patients.

Health care participants, like providers and employers, regularly deal with a number of health care plans from various health insurers. These participants, however, can only obtain information from the insurance companies in limited ways, often making the acquisition of such information quite burdensome. Participants 10 usually only have the telephone, fax, or letter available as a means of communication with the insurers.

Particularly vexing is the timely availability of information from insurers regarding financial transactions, such as eligibility, claims, and benefits, and basic patient-related information, such as medical tests and prescriptions. For 15 example, a provider may seek information from an insurer via a submission form or telephone call to that insurer. In many cases, however, such information is sought or received after the care has been delivered and the patient has left the provider's office. This may result in the delivery of services that are not authorized or covered by the patient's insurer, or may result in other consequences that might impact the type or 20 cost of the services provided.

Another reason for these difficulties is the recent expansion of the "payor" community. At one time, payors consisted of the government (both federal and state) and large insurance companies. Now, a complex array of self-insured plans, IDN's, IPA's, and PPO's, undertaking full or partial capitation, insurance 25 carve-outs, and the like have radically increased the number of users of, and the need for, current information regarding insureds. Most of these entities, both small and large, do spend considerable sums on information systems. Yet, because of the extent of manual processing that exists despite these systems, costs per claim remain substantial.

30 In addition, payors incur the wrath of their providers and patients by designing complex rules that are difficult or perceived as impossible to administer or follow. Though contrary to this perception, payors do have an interest in providing

timely information to providers, patients, employers, and other participants. Still, a significant percentage of a provider's claims are rejected often because they do not comply with all of the rules. These claims require resubmission, telephone calls, and other expensive manual interventions. The dollar costs for this current processing scheme are high. In fact, an entire clearinghouse industry has been developed to provide eligibility (but not benefits) verification services to providers for a fee. Many of the requested verifications, however, cannot be performed at all by such clearinghouses, and those that are performed are often unacceptably cumbersome and, thus, too expensive.

10 Referral authorizations are often even more complex than claims and such authorization services are generally not available via traditional clearinghouses. Each time a provider writes a prescription, for example, it is written against a formulary specific to that patient's health care plan established by their insurer. Because there are so many formularies, drug prescriptions, too, are often rejected for 15 payment, causing additional work for both the provider and the patient. Similarly, medical tests must be sent to laboratories contracted to support a particular plan, and are reimbursed only when matching complex medical necessity rules.

20 Many providers do have practice management systems that track encounters and manage billing. None of these systems, however, have the sophistication to accomplish the task of providing all of the information from all the various health insurers in such a cogent form that can be useful to the provider.

25 Not only providers, but patients, too, spend a majority of their time interacting with the health care system engaged in non-health care activities. This "wasted" time is virtually all related to scheduling appropriate interventions, to waiting for information or services, or to obtaining authorization, reimbursement, or other information for desired or required health care.

30 The internet has emerged as a major source of health care information for the public. A substantial portion of internet users use it for health care information or management. Specifically, patients search the internet for medical information and answers related to their area of concern. In fact, it is becoming common for a patient to enter a physician's office armed with printouts and long lists of questions and recommendations from web pages on the internet.

Unfortunately, even with the connectivity the internet provides, information exchange between insurers and patients is lacking. Most of the information available to patients from their insurer is on an automated basis from databases related to either general health care literature or to specific normality support groups. A critical aspect of the patient's health care program, however, is not only knowledge of the normality or support groups, but also what their insurer's health care plan provides as treatment options for that normality, eligibility information, referral authorization, claim submission and payment, testing, and medications. As discussed, these functionalities are too complicated for the current system to handle in an automated environment. Personally-referenced information linked to an individual patient's provider and health care plan is generally unavailable, because that data exists in several databases often each in a different, incompatible format, requiring human intervention to extract and process the data. The patient's current solution is, thus, an endless number of telephone calls at a high cost in dollars, time, and frustration.

A reason for such incompatibility is that each database served the individual needs of those using the data before such a time when connectivity between databases was a consideration. The consequence of having different databases of different formats is that it is not possible to provide a central repository of homogenized data readable by any variety of computers. It is this incompatibility that prevents wide spread connectivity between insurers and participants.

Transliterating and interfacing programs are known in the art. Programs that take data in one format can be translated and read by a computer of a different format. Such transliterating, however, only shifts data from a field of an incompatible format to a target field of a new format. It cannot determine whether the data of the incompatible format is being transferred to the correct target field. Normalization or remodeling of the data not only transfers the data, but also determines the meaning of the data and puts that data in the correct field.

It would, therefore, be beneficial to provide a system with which insurers may communicate with providers, patients, etc., to provide information about a particular health care plan either before, or contemporaneously with, the patient's visit to the provider, regardless the lack of compatibility of the databases. It would be

further beneficial if this system of communication spanned a variety of insurers so the provider, for example, may communicate with any plan in which the patient participates. It would also be beneficial for providers to have an automated system of determining eligibility and benefits, receiving authorizations and pre-certifications, 5 submitting claims, obtaining reimbursements, and adjudicating claim problems through the normalization of data of the incompatible databases.

Accordingly, an illustrative embodiment of the present disclosure provides an apparatus for communicating health care data from a sender to a receiver. The apparatus comprises a first computer system, a second computer system, and a 10 rules engine. The first computer system having health care data stored therein. The second computer system is in operable communication with, and is configured to extract the health care data from the first computer system. The rules engine normalizes the extracted health care data to a predefined format. The rules engine defines a plurality of health care data fields in the predefined format, as well as a 15 plurality of relationships between fields of normalized data.

Further embodiments may include the first computer being a plurality of computers each having portions of the health care data stored thereon. The apparatus may also comprise a third computer system, in operable communication with, and configured to receive the normalized data from, the second computer 20 system. The rules engine may determine whether the third computer is authorized to receive the health care data.

Another illustrative embodiment provides a method for communicating health care data from one computer system to another. The method comprises the steps of storing health care data in a first computer system; extracting health care data 25 from the first computer system and communicating the extracted data to a second computer system; normalizing the extracted data to a predefined format in accordance with a rules engine that defines a plurality of health care data fields in the predefined format and a plurality of relationships between fields of normalized data; and communicating the normalized data to a third computer system.

30 Further embodiments of the illustrative method may include the first computer system comprising a plurality of computers, wherein the storing step includes storing health care data in more than one of said computers. Also, the third

computer system comprises a plurality of computers. The health care data exists across a plurality of databases such that each of the plurality of databases are in operable communication with the second computer system.

Another illustrative embodiment provides a system of exchanging 5 health care data between a sender and a receiver. The system comprises a sender computer, an intermediary computer, a rules engine and a receiver computer. The sender computer stores the health care data. The intermediary computer is in operable communication with the sender computer and is configured to extract the health care data. The extracted data is normalized to a predefined format, creating normalized 10 data pursuant to a rules engine. The rules engine defines each field of the health care data and converts each field to a corresponding field in the predefined format. The rules engine also defines how the normalized data should relate to each other pursuant to predetermined instructions. The receiver computer is in operable communication with the intermediary computer. The receiver computer receives the normalized data 15 subjected to the second rules engine.

Further embodiments may include the sender computer being a plurality of computers each having portions of the health care data stored thereon. The rules engine may determine whether the receiver computer is authorized to receive the health care data. When the receiver is a health care provider, the 20 normalized data exchanged between the sender and receiver may be chosen from a group comprising eligibility/benefit display, member roster, claim submission, provider lookup, formulary lookup, diagnosis code lookup, procedure code lookup, access health plan information online, communicate with a health plan on-line, communicate with patients on-line, patient-centric view of data across several health 25 plans, order generation and tracking, results review and release, result printing, prescription writing, medication profile for each patient, access to patient's personal health record based on patient approval, personalized medical and health care content integration, both context-specific and on demand, e-commerce integration: office, medical and health-related product awareness and buying capabilities, email, practice 30 management system subscription, support disease management, and physician credentialing subscription. When the receiver is an employer, the normalized data exchanged between the sender and receiver is chosen from a group comprising group

eligibility, group enrollment, enrollment changes, formulary lookup, e-commerce integration, access from health plan web site or direct access via URL, personalized content integration, both context-specific and on demand, e-commerce integration and health care-related product awareness and buying capabilities.

5 When the receiver is a patient, the normalized data exchanged between the sender and receiver is chosen from a group comprising identification card requests, address changes, provider directory inquiries, personalized health information based on an interest profile, diagnosis information, relevant articles and patient education materials, communications from health care providers and health
10 care plans, lab and radiology results, scheduled appointments with a health care provider, prescription refills, personal health records, eligibility/benefit information, claim information, referral and authorization information and status, provider lookup, family history, medication profile and formulary lookup.

Another illustrative embodiment of the present invention provides a
15 system of normalizing health care data for transfer between an insurer and a participant. The system comprises an insurer system, an intermediary system, and a participant system. The insurer system is configured to maintain at least one database comprising the health care data. The intermediary system is operatively connected to the insurer system and to the database, configured to extract the health care data from
20 the database of the insurer system, and store the health care data in a staging database as extracted data. The extracted data is normalized to a predefined format, creating normalized data pursuant to a rules engine that defines each field of the extracted data in the predefined format. The rules engine also defines how the normalized data relates to each other pursuant to predetermined instructions. The participant system is
25 in operable communication with the intermediary system, and is configured to receive the normalized data subject to the rules engine.

Further embodiments of the illustrative system may include the at least one database being a plurality of databases, such that the intermediary system is operatively connected to the plurality of databases. In addition, the participant system
30 may transmit a request that is sent to the intermediary system that determines which health care data is to be extracted and normalized in order to respond to the request. The participant system may also transmit the request, and the intermediary system

may transmit the normalized data over the internet. The rules engine may define the relationships among the normalized data pursuant to predetermined instructions to determine a response to the request. The intermediary system may also comprise an error data system that removes extracted data identified as invalid when the extracted 5 data is normalized. The extracted data identified as invalid is then corrected, reintroduced, and is normalized. The intermediary system may further comprise an audit database to track the activity of the intermediary system.

Another illustrative embodiment of the present invention provides a system of health care management of medical testing administration between an 10 insurer, a medical laboratory, and at least one health care participant. The system comprises a participant computer, an insurer processing system, a rules database, and a laboratory computer. A medical test request is made at the participant computer pursuant to a first predetermined format. The insurer processing system is operatively coupled to the participant's computer, and is through which the medical request is 15 transferred. The processing system is operatively coupled to the rules database to approve the medical test request pursuant to predetermined criteria. The laboratory computer is operatively coupled to the processing system and receives the medical test request if approved by the rules engine. Results of the medical test are transmitted from the laboratory computer to the processing system. The results are 20 further transmitted to an insurer computer that is operatively coupled to the laboratory computer and to participant's computer.

Further embodiments of the illustrative system may include the processing system converting the results of the medical test to a second predetermined format readable by a database stored on the insurer computer. In addition, at least 25 one health care participant may be chosen from a group comprising from a health care provider, an employer, and a patient. Furthermore, the medical test request and the results of the medical test may be transmitted through the internet.

Additional features and advantages of the system will become apparent to those skilled in the art upon consideration of the following detailed descriptions 30 exemplifying the best mode of carrying out the system as presently perceived.

BRIEF DESCRIPTION OF THE DRAWINGS

The illustrative system will be described hereinafter with reference to the attached drawings which are given as non-limiting examples only, in which:

5 Figure 1 is a diagrammatic view of a system for normalization of health care data and the exchange of same between several health care insurers and various health care participants;

Figure 2 is a diagrammatic view of the data processing system for the system of normalization shown in Fig. 1;

10 Figure 3 is a diagrammatic view of the data extraction and business object sub-systems for the system of normalization shown in Fig. 1; and

Figure 4 is a diagrammatic view of a system of health care management for medical testing between health care insurers and participants.

15 Corresponding reference characters indicate corresponding parts throughout the several views. The exemplification set out herein illustrates an embodiment of the invention, and such exemplification is not to be construed as limiting the scope of the invention in any manner.

DETAILED DESCRIPTION OF THE DRAWINGS

An illustrative embodiment of the invention, such as that shown in Fig. 20 1, comprises a system 2 which includes a plurality of database sets 4, 6, 8 offered by a variety of insurers 11. It is appreciated that each health care database set 4, 6, 8 represents an insurer's database processing system or series of processing systems and databases. For example, database sets 4, 6, or 8 may each represent a conventional computer system, a server, a local area network (LAN), a legacy, or other computer 25 system storing one or more databases. It is contemplated that to transmit data, either the system as it exists is capable of doing so, or a system is added to either database sets 4, 6, or 8 to perform this function. It is further contemplated that each of database sets 4, 6, 8 may represent a single database or a plurality of databases, each of which may be of any variety of database formats or languages.

30 For the purposes of this application, it is contemplated that reference to the term "insurer," as used herein for insurers 11, is for illustrative purposes only. Such a term includes health insurance companies, but also includes health

maintenance organizations, self-insured entities, disease management organizations, capitated health care providers, Medicare agencies, as well as any other organization that might store or manage health care data. The term "insurer" is not to be construed as being limited in scope to only health insurance companies or other "payors."

5 Conventionally, health care data is stored on an insurers' computer or series of computers in several databases, each of which often being in a unique format, with each database format being incompatible with other database formats. For example, one insurer may have their health care data stored in one format, and a second insurer may have their health care-related data stored in a second format that is
10 not compatible with the one format. Additionally, and more problematic is that, even within the same insurer's 11 system, eligibility data, for example, may exist in a database of one particular format, developed to suit the needs of its users at the time, whereas, the claims data, for example, may be stored in another database in a format that suits the needs of those users, but with its format being incompatible with the
15 format of the eligibility data. In either example, it is contemplated that in the present invention, health care data of any format is normalized into a common format, and distributed through a common network, like internet 12, to a health care participant 13, who uses the normalized data to conduct health care-related transactions and tasks. It is further contemplated, and to be discussed further herein, that various levels
20 of access and security can be provided to assure that those participants 13 accessing the normalized data are authorized to access only that data predetermined as necessary and appropriate for their particular use or need.

As Fig. 1 shows, data from each database set 4, 6, 8 can be transmitted to a data processing system 10 that normalizes the data into a format readable by
25 particular health care participants 13. More specifically, the data is transmitted over the internet 12, which is operatively connected to and read by participants' 13 computer(s) or terminal(s). Such participants 13 illustratively include providers 14, employers 16, and patients 18, or any combination thereof. It is contemplated that participants 13 can further include any other interested party that can request data or
30 information from an insurer, including other insurers and disease management organizations, for example.

It is contemplated that the transmission of data from database sets 4, 6, or 8 is initiated by any of the participants 13 submitting a request 22 through a computer or computers. Request 22 is transmitted through the internet 12 to data processing system 10 which retrieves the appropriate data from the appropriate 5 database set or sets of either 4, 6, or 8. That data is normalized to a common format, at which point a response 24 to the request 22 is made. For example, a health care provider 14 may place a request 22 on behalf of an insured to authorize payment for a medical procedure. In this example, it is presumed that the data required to formulate a response 24 exists collectively on eligibility, benefits, and claims databases that 10 illustratively exist on database set 4. Data processing system 10, in order to prepare a response 24, determines and extracts which data is necessary from the databases. System 10 then normalizes the data into a homogenous format, and then determines what the nature of the response should be. In this example, response 24 should be to either authorize or deny payment for the medical procedure. System 10 uses the 15 normalized data to determine the response, which is then transmitted to provider 14, thus, completing the transaction. It is contemplated that system 2 may comprise any number of insurers 11 or participants 13. Specifically, data processing system 10, as will be discussed further herein, is able to connect and manage transactions between a single or plurality of participants 13 with any insurer or plurality of insurers 11.

20 It is further contemplated that system 2 will provide health care participants 13 with a variety of health care transaction options referred to generally in the form of requests 22 and responses 24 between participants 13 and insurers 11. Examples of transactions available to health care providers 14 are: eligibility/benefit display, member roster, claim submission, provider lookup, formulary lookup, 25 diagnosis code lookup, procedure code lookup, access health plan information online, communicate with a health plan on-line, communicate with patients on-line, patient-centric view of data across several health plans, order generation and tracking, results review and release, result printing, prescription writing, medication profile for each patient, access to patient's personal health record based on patient approval, 30 personalized medical and health care content integration, both context-specific and on demand, e-commerce integration: office, medical and health-related product

awareness and buying capabilities, email, practice management system subscription, support disease management, and physician credentialing subscription.

As further example, the following are specific records and fields for health care transactions between providers 14 and insurers 11 that utilize normalized data:

Record: Summary

Fields:

10	Activity for (date) Referrals Claims Test Results Members
15	Update State for Americas Health Benefit Records Claim Records Patient Records Provider Records
20	New Just For You

Record: Eligibility

Fields:

25	Today's Patients Patient Search Sex Coordination of benefits
30	Medicare data Add to patient list Name From Date To Date Birth date Member ID
35	Relation PCP Address City State Zip
40	Current Benefit Group Carrier
45	

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Benefit Plan

Record: Claim Status5 **Fields:**

10 Patient Name
 From Date
 To Date
 Claims
 Claim Number
 Status
 Provider Name
 Patient Name
15 Member Number
 Billed Amount
 Patient Responsibility
 Paid Amount
 Date of Service

20

Record: Claim Detail5 **Fields:**

25 Member
 Provider
 Diagnosis
 Description
 Line number
30 DOS
 CPT
 Description
 Modifier
 Location
35 Units
 Status
 Billed
 Allowed
 Copay
40 Coinsurance
 Deductible
 Paid
 Totals

45 **Record: Explanation of Payments****Fields:**

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Line Number	Status Description	Explanation	Check/Date
5			

Record: Select Specialist

Fields:

10	Address City, State, Zip Handicap Access
15	Office Hours Contact Phone Fax Phone Phone After Hours
20	Sex Birth Date Specialty Second Specialty Accept Patient
25	Primary Care Board Cert Languages Hospitals Hospital Privileges Networks

Record: Add Claims

Fields:

35	Health Insurance Insured's ID Number
	Patient Last Name
	First Name
	Middle Name
40	Patient's Address 1
	Address 2
	City
	State
	Zip
45	Patient's Phone
	Birth date
	Gender

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Relationship to Insured
Marital Status
Patient Employment Status
Condition Related to Job
5 Con. Rel. to Auto Accident
Cond. Rel. to Other Accident
Insured's Last Name
First Name
Middle Name
10 Gender
Birth date
Insured's Address 1
Address 2
City
15 State
Zip
Phone
Insured's Group or FECA Number
Insured's Employer/School
20 Insured's Insurance Name
Referring Physician Name
Referring Physician ID
Outside lab
Outside Lab Charges
25 Medicaid Resub Code
Medicaid Orig.
Prior Auth. Number
Diag Codes
Item
30 Date From
Date To
Place
Type
Procedure
35 Mod1
Mod2
DX Ind.
Charges
Days/Units
40 Patient
Provider
From Date
To Date
Diagnosis 1
45 Diagnosis 2
Diagnosis 3
Diagnosis 4

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Procedure Line
CPT
Description
Amount
5 Dx pointer
Other Errors
Total Amount
Billed
10 Allowed Amount
Copay Amount
Withheld Amount
Writeoff Amount
Predicted Payment

15 **Record: Referral Status****Fields:**

20 Referral Number
Patient (Member ID)
Valid from (months)
Referred by
Referred to
Patient List
25 Referred by
Referred to
Referral Number
Status

30 **Record: Add Referrals****Fields:**

35 Today's Patients
Patient Search
Specialists
Specialist Search
Providers
Diagnosis
40 Patient
Specialists
Provider
Diagnosis
Start Date
45 Months Valid
Visits Requested
Reason

Record: Procedure and Diagnosis Data**Fields:**

5	Diag Number
	Diagnosis Name
	Proc Code
	Procedure Name
10	Visits Allowed
	Patient
	Patient Search
	Referred to
	Specialist Search
15	Referred by
	Diagnosis
	Start Date
	Exp Date
	Visits Requested
20	Remarks
	Services Requested
	Authorized Ancillary Services

Record: Diagnosis Codes

25	Fields:
	Diagnosis Code
	DX Code
30	Diagnosis Code Description

Record: Procedure Codes

35	Fields:
	Procedure Codes
	Procedure Code
	Procedure Description
	Age From
40	Age To
	Sex
	Location Code

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Record: Drug Therapeutic Class Listing**Fields:**

5 Therapeutic Class
Class Description
Count of Drugs in this Class

Record: Formulary List by Therapeutic Class

10

15 Drug Name
Generic Name
Drug Class
Therapeutic Class
NDC

Record: Write Prescription

20

25 Fields:

Today's Patients
Patient Search
Providers
For
Medication
Dispense
Refill

30 Sig: Take
Sig: For
Instructions
Select Pharmacy

35 **Record: Medication Profile**

Fields:

40 Type
Medication
Dose
Frequency
Reason
Status

45

Record: Discontinued Medications

Fields:

5 Type
 Medication
 Dose
 Frequency
 Reason
 Status

10 Record: Allergies

 Allergen
 Reaction
 Date Started

15 Record: Medical Test Orders**Fields:**

20 Patient ID
 Patient Name
 Provide ID
 Provider Name
 Location
25 Lab Name
 Dx
 Action
 Battery
 Test
30 ID
 Type
 Volume
 Date
 Time
35 Collected By
 Chemistry
 Hematology
 Toxicology/Therapeutics
 Microbiology/Virology
40 Immunology/Serology
 Urinalysis/Fluids
 Procedure
 When

Priority
Specimen
Alert

5 Record: Results

Fields:

10	Status Order number Test Procedure Alert Order Date Facility
15	Patient Provider Date/Time Procedure Status
20	Indicator Date/Time Performed Specimen Number
25	Type Status Result Value Desired Range
30	Each field listed above represents data that can exist anywhere on database sets 4, 6, or 8, and be in any format or language. If any request 22 is made which calls up one or more of the above records, data processing system 10 searches, extracts, and normalizes the data so it appears in the correct field in the record. It is appreciated that provider 14 may change the data, if necessary, and transmit it back through internet 12 and data processing system 10 to be stored on the appropriate database set 4, 6, or 8.
35	

Examples of transactions available to employers 16 are: group eligibility, group enrollment, enrollment changes, formulary lookup, e-commerce integration, access from health plan web site or direct access via URL, personalized content integration, both context-specific and on demand, e-commerce integration:

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human resource, business (e.g., office supplies) and health care-related product awareness and buying capabilities.

Again, as a further example, the following are specific records and fields for health care transactions between employers 16 and insurers 11 that utilize 5 normalized data:

Record: Open Enrollment

Fields:

10	Health Insurance Employer Group Number Last Name First Name Middle Name
15	Employee Address 1 Address 2 City State Zip
20	Home Phone Work Phone Primary Language Birth date Gender
25	Social Security Number Primary Care Physician Established Patient Dependent Last Name First Name
30	Middle Initial Birth date Gender Relationship
35	Social Security Number Primary Care Physician Established Patient Effective Date Hire/Rehire Date
40	Other Health Care Policy Name and Address of Insurer Effective date of other coverage Policy Holder's Last Name First Name Middle Name
45	Policy/Group Number

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Record: Enrollment - Changes

10

Fields:

15	Health Insurance Employer Group Number Last Name First Name Middle Name Employee Address 1 Address 2
20	City State Zip Home Phone Work Phone
25	Primary Language Birth date Gender Social Security Number
30	Primary Care Physician Established Patient Term Member Dependent Last Name First Name Middle Initial
35	Birth date Gender Relationship Social Security Number
40	Primary Care Physician Term Dependent Hire/Rehire Date Effective Date Change Reason
45	Name Enrollment Type Remarks

Examples of transactions available to patients 18 are: identification card requests, address changes, provider directory inquiries, and personalized health information based on the member's interest profile, as well as diagnosis information from health plan administrative and clinical information, relevant articles and patient 5 education materials, communications from health care providers and health care plans, lab and radiology results to patients online, scheduled appointments with a health care provider, referral status, prescription refills, education materials, personal health records so it can be maintained in his or her comprehensive health history online for physician reference, view eligibility/benefit information, view claim 10 information, view referral and authorization information, provider lookup, personal health record, family history, medication profile, formulary lookup, and communications between member and provider.

The architecture of the data processing system 10 is shown in Fig. 2. Each of the database sets 4, 6, 8 is operatively connected to data connectivity sub- 15 system 20. The data connectivity sub-system 20 is configured to receive the different types of connections used between the various computer systems which store the database sets 4, 6, 8. It is appreciated that, in other embodiments, a separate data processing system 10 may be provided at the site of each of the database sets 4, 6, 8 such that each data processing system 10 is dedicated to manage and normalize the 20 data, as discussed further herein, as well as manage server-to-server communications for a single database set.

The data extraction sub-system 28 is also depicted in Fig. 2. Sub- system 28 manages the integration of the often plurality of databases. The data extraction sub-system 28, as further discussed in reference to Fig. 3, also includes 25 logic to manage data access from the several databases of database sets 4, 6, 8. An enterprise master person index ("EMPI") 30 is operatively coupled to data extraction sub-system 28. The EMPI 30 presents a cross-database view of all the insureds within system 2. It also manages the proper identification of providers 14, employers 16, connected patients 18, as well as other entities having unique identities on an as- 30 needed basis. An indices database 32 is supported by EMPI 30. Specifically, the indices database 32 stores indices which serve as a basis for relating the identification

data to each other. The indices database 32 is typically built upon and maintained by the EMPI 30.

The business object sub-system 34 contains the logic rules that drives the normalization of data and use of same between insurers 11 and participants 13.

- 5 To provide such capabilities, a variety of processes may be supported in any particular situation. Illustratively, such processes may include, but are not limited to, rules-based evaluation of entered data for referral authorizations and admission pre-certifications; proxy or actual adjudication of claims submitted by providers, with concomitant delivery of funds to insurers 11 and benefits explanations to patients 18;
- 10 sorted lists of providers 14, employers 16, and patients 18; and graphical displays of laboratory results and integrated claims-driven health records for patients 18.

The content/e-commerce sub-system 36 adds third party capabilities to the data processing system 10. The content portion of sub-system 36 provides management and integration of third party affiliated content, such as articles about diseases, bulletins, notices, notes, and other medically-related references. The e-commerce portion of sub-system 36 integrates e-commerce capabilities, including business-to-business or business-to-consumer purchasing through shopping cart-type databases with affiliated product and service vendors.

- 15 The personalization sub-system 38 integrates information from the previous sub-systems 20, 28, 34, 36 to provide a personalized view of data in system 2. Specifically, when any of the participants 13 login to system 2 and access data or other information from database sets 4, 6, or 8, or even the content/e-commerce sub-system 36, pertinent information derived from the type of content viewed, as well as the products purchased or searched, is maintained in a user profile database 40.
- 20 During subsequent logins, therefore, the information a particular user views can be arranged and accessed in a more familiar, relevant, and useful manner, individual to that participant.

- 25 The presentation sub-system 42 manages the normalized data and information into a presentable format for participants 13. For example, the world-wide-web, being a popular destination for users of the internet, accepts output in HTML format, and is accessible by a conventional internet browser. It is appreciated,
- 30

however, that such data may be presented in virtually any form to accommodate different access devices (for example, WAP for mobile devices).

A security sub-system 44 is shown in Fig. 2 integrated with the other sub-systems 20, 28, 34, 36, 38, 42. Security sub-system 44 maintains data security in several ways. First, one embodiment contemplates that the insurers' 11 data is maintained on its own on-site database, and is controlled by the insurers 11. Second, the insurers' 11 data is encrypted when it is routed from the insurers' 11 database to the connectivity sub-system 20 and, ultimately, the participants 13 when a request 22 is made. Third, the participants' 13 browser includes encryption to view or send data over the internet 12. Finally, internal security is built into the data processing system 10 to only allow users with need-to-know access to particular data, such as claims and referral information. For example, providers 14 may have access only to claims and referral information of their insurers, but not individual claim summaries of their patients. Similarly, the employers 16 may have access to only their employees' claims information, but not some personal information.

An example of an encryption method is the 128 bit Secure Sockets Layer (SSL) with a key certified by VeriSign, Inc. Such SSL encryption means that data traveling through the internet and to participants' 13 browser cannot be interpreted by anyone between those two locations. Encryption is also useful because of the storage of user passwords. There is no place that a user's password is saved or used by the system as traditional cleartext. From one of the participants' 13 browser through internet 12 and to one of the insurers' 11 computer or server, the password is protected by SSL. Once the password reaches the final destined server, a cryptographic algorithm converts the password to a protected format. No one, therefore, who has privileged access to the server or any of the back-end applications can get any user passwords.

In addition, encryption is useful along the operative connection to an insurer's 11 database sets 4, 6, or 8 to the data processing system 10. It is contemplated, however, that insurers' 11 computers or servers (database sets 4, 6, or 8) may not need such encryption along this operative connection, if the connection is a true point-to-point connection. Also, this encryption can be implemented through

hardware or software, a virtual private network (VPN), or through the use of encryption protocols in a database, for example.

There are several modes with which data can be restricted, even within and among the insurers 11 and participants 13 of system 2. For example, security 5 sub-system 44 may restrict the actual data that a participant 13 may request or view from any of insurers 11. A health care organization, thus, may only view data that they have provided. For example, doctors may only view claim data for their own patients. Alternatively, security sub-system 44 may restrict access to participants 13 to allow access to only particular fields on a particular screen of any particular 10 database. For example, if a screen listed dollar amounts for claims, employers may wish to restrict who is able to view those dollar amounts. Other users, therefore, like patients 18, might be able to see the rest of the claims, but not the dollar amounts. Still, further, security sub-system 44 may restrict which screens will be accessible to which users. This level of security defines which functionality is available to the user. 15 For example, a patient 18 in system 2 may not be able to view the claim submittal screen submitted by provider 14 at all, but may view a diagnosis information or health plan administrative screen. Customizable security based on the interests of the user may be included as well. This security method allows either the insurers 11 or participants 13 to set the parameters of security for the examples described above. It 20 is further contemplated that this tool may be an internet-based tool that could add logins to the system, as well as specify values and screens that a particular user has access to. It is still further contemplated that a portion or all of the security measures can be employed throughout data processing system 12.

An audit sub-system 46, like security sub-system 44, shown in Fig. 2, 25 is also integrated with the other sub-systems 20, 28, 34, 36, 38, 42. Audit sub-system 46 tracks the operation of all sub-systems. The information generated from audit sub-system 46 allows an administrator to monitor the operation of system 2 for problems and marketing trends.

A diagrammatic view of the data extraction and business object sub- 30 systems 28, 34, respectively, is shown in Fig. 3. As previously discussed, the numerous databases represented by database sets 4, 6, 8 contain data in a variety of formats. Before the data is transferred to one of the participants 13, however, it is first

formatted to a new format that is readable by any of the computers of participants 13, like HTML format, for example. The data is, therefore, "extracted" from the database sets, either 4, 6, or 8, and then "normalized" to be read by the computers of participants 13. The extracted data is indicated by reference numeral 48.

5 Extracted data 48 from either database sets 4, 6, or 8 is uploaded to a staging database 50 which is typically a portion of data extraction sub-system 28. Rules engine 52 serves a dual purpose of defining the rules that control the normalization of the data, as well as how the data, once normalized, is used. During the normalization process at 54, rules engine 52 homogenizes the data by determining
10 what the data means, then inserting the data into the proper field as normalized data. Rules engine 52 also remodels the data, if necessary, to a structure or appearance predefined by the normalized format. As a simple example, in a referrals database that may hypothetically exist on database set 6, it may include the entry "New Jersey" in the state location field. If that field is requested by a participant 13, the rules
15 engine 52 will cause that field to be extracted, then determine whether the meaning of this field corresponds to the meaning of the normalized state location field, and, if so, then convert the field to the normalized state location field at 58. Furthermore, if the rules engine 52 has predetermined that the normalized state location field should exist as only a two-character acronym, then the phrase "New Jersey" will be remodeled to
20 the acronym "NJ." This is contrasted with traditional transliterating programs that would merely match the state location field of the referrals database with any field in another database titled "state location field" and then transfer the data. Such a program cannot determine the meanings of the state location fields, and then determine if their meanings matched, as well as not remodel the data to the
25 appropriate appearance. For example, a field for laboratory enzymes might be expressed in Celcius in one database and in Fahrenheit in another database. Such data, as well as countless other data, are typically contextualized by the system they exist in. Transliterating programs do not compensate for such context among data. In the present disclosure, part of the normalization is determining the meaning of the
30 data and locating it in a field of the same definition, but in a single format.

Rules engine 52 also determines whether the data is bad or invalid. Any bad or invalid data that is discovered during the normalization process at 54 is

transferred to an invalid data database 56. Invalid data is placed in database 56 for review and appropriate corrective action and, if appropriate, reintroduced and normalized.

In addition, the rules engine 52 incorporates security 44 to determine 5 whether the requestor has authorization to view the data that is being requested, as previously discussed. For example, if employer 16 requests claims data that illustratively exists on database set 8, the rules engine 52, in conjunction with the security 44, determines whether employer 16 has authorization to view the data subject of that request. If not, rules engine 52 would deny fulfillment of the request.

Once the data is converted and remodeled into the normalized format, rules engine 52 determines how the normalized data can be used. For example, if a request 22 is made from providers 14 to one of the insurers 11 to authorize a chest X-ray for one of the patients 18, a proper response 24 may reference data from various 10 eligibility, claims, benefits, and personal data databases which rules engine 52 first extracts and normalizes. Once the data is normalized, rules engine 52 undertakes the 15 process of responding to request 22. Rules engine 52 bases response 24 on predetermined rules established by the particular insurer 11 to determine whether a chest x-ray is an approved procedure in response to the request. It is contemplated that each insurer 11, or even each database set 4, 6, 8 can be subject to its own unique 20 set of rules to govern any particular response 24.

An audit database 62, illustrated in Figure 3, manages and maintains tracking information during the conversion process at 58. All data requests, responses, and e-commerce submissions can be monitored and recorded. This audit 25 trail information is maintained in audit database 62 to enhance performance and security characteristics. It is contemplated that audit database 62 can be integrated with audit sub-system 46, as shown in Fig. 2, or database 62 can be a stand-alone system working independently or in addition to sub-system 46.

In one embodiment of the disclosure, it is contemplated that system 2 will not only exchange information related to insurance and payment issues, but also 30 provide active management of patient care. For example, as shown in Fig. 4, a portion of system 2 depicts the process for medical tests to be ordered, approved, and results submitted. For example, a health care provider 14, via the internet 12, places

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an order for a medical test. The order is transmitted through data processing system 10. The order is further transmitted at 72 to a laboratory 70, the order will disclose particular information that will be needed when either the specimen or the patient arrives. If a specimen is collected by provider 14, the order will identify the 5 laboratory 70, and provide information to provider 14 so that the specimen may be marked accordingly before being sent to laboratory 70. Once laboratory 70 receives the order and the specimen, laboratory 70 can either communicate the status or results back through data processing system 10 to both the provider 14 and the appropriate insurer 13', as indicated by reference numerals 74, 76, respectfully.

10 Although the system has been described with reference to particular means, materials and embodiments, from the foregoing description, one skilled in the art can easily ascertain the essential characteristics of the illustrative system and various changes and modifications may be made to adapt the various uses and characteristics without departing from the spirit and scope of the present invention as 15 described by the claims which follow.

What is claimed is:

1. Apparatus for communicating health care data from a sender to a receiver comprising:
 - 5 a first computer system having health care data stored therein;
 - a second computer system in operable communication with, and configured to extract the health care data from the first computer system; and
 - a rules engine to normalize the extracted health care data to a predefined format, said rules engine defining a plurality of health care data fields in
 - 10 the predefined format and a plurality of relationships between fields of normalized data.
2. Apparatus of Claim 1, further comprising a third computer system, in operable communication with, and configured to receive the normalized data from, the second computer system.
- 15 3. The system of Claim 1, wherein the first computer is a plurality of computers each having portions of the health care data stored thereon.
4. The system of Claim 2, wherein the rules engine determines whether the third computer is authorized to receive the health care data.
5. The system of Claim 1, wherein the normalized data exchanged
- 20 between the sender and receiver is chosen from a group comprising eligibility/benefit display, member roster, claim submission, provider lookup, formulary lookup, diagnosis code lookup, procedure code lookup, access health plan information online, communicate with a health plan on-line, communicate with patients on-line, patient-centric view of data across several health plans, order generation and tracking, results review and release, result printing, prescription writing, medication profile for each patient, access to patient's personal health record based on patient approval, personalized medical and health care content integration, both context-specific and on demand, e-commerce integration: office, medical and health-related product awareness and buying capabilities, email, practice management system subscription,
- 25 support disease management, and physician credentialing subscription, wherein the receiver is a health care provider.
- 30

6. The system of Claim 1, wherein the normalized data exchanged between the sender and receiver is chosen from a group comprising group eligibility, group enrollment, enrollment changes, formulary lookup, e-commerce integration, access from health plan web site or direct access via URL, personalized content integration, both context-specific and on demand, e-commerce integration and health care-related product awareness and buying capabilities, wherein the receiver is an employer.

7. The system of Claim 1, wherein the normalized data exchanged between the sender and receiver is chosen from a group comprising identification card requests, address changes, provider directory inquiries, personalized health information based on an interest profile, diagnosis information, relevant articles and patient education materials, communications from health care providers and health care plans, lab and radiology results, scheduled appointments with a health care provider, prescription refills, personal health records, eligibility/benefit information, claim information, referral and authorization information and status, provider lookup, family history, medication profile and formulary lookup, wherein the receiver is a patient.

8. A method for communicating health care data from one computer system to another, comprising the steps of:

20 storing health care data in a first computer system;

 extracting health care data from the first computer system and communicating the extracted data to a second computer system;

 normalizing the extracted data to a predefined format in accordance with a rules engine that defines a plurality of health care data fields in the predefined format and a plurality of relationships between fields of normalized data; and

25 communicating the normalized data to a third computer system.

9. The method of Claim 8, wherein said first computer system comprises a plurality of computers, and wherein said storing step includes storing health care data in more than one of said computers.

30 10. A method of Claim 8, wherein said third computer system comprises a plurality of computers.

11. The method of Claim 8, wherein the health care data exists across a plurality of databases, each of the plurality of databases being in operable communication with the second computer system.

12. A system of exchanging health care data between a sender and 5 a receiver, the system comprising:

a sender computer upon which health care data is stored;
an intermediary computer in operable communication with the sender computer;

10 wherein the intermediary computer is configured to extract the health care data;

a rules engine configured to receive the extracted data and normalize same to a predefined format, said rules engine defines each field of the extracted data and converts each field to a corresponding field in the predefined format, creating normalized data, said rules engine also defines how the normalized data should relate 15 to each other pursuant to predetermined instructions; and

a receiver computer in operable communication with the intermediary computer and configured to receive the normalized data.

13. The system of Claim 12, wherein sender computer is a plurality of computers each having portions of the health care data stored thereon.

20 14. The system of Claim 12, wherein the rules engine determines whether the receiver computer is authorized to receive the health care data.

15. The system of Claim 12, wherein the normalized data exchanged between the sender and receiver is chosen from a group comprising eligibility/benefit display, member roster, claim submission, provider lookup, 25 formulary lookup, diagnosis code lookup, procedure code lookup, access health plan information online, communicate with a health plan on-line, communicate with patients on-line, patient-centric view of data across several health plans, order generation and tracking, results review and release, result printing, prescription writing, medication profile for each patient, access to patient's personal health record 30 based on patient approval, personalized medical and health care content integration, both context-specific and on demand, e-commerce integration: office, medical and health-related product awareness and buying capabilities, email, practice management

system subscription, support disease management, and physician credentialing subscription, wherein the receiver is a health care provider.

16. The system of Claim 12, wherein the normalized data exchanged between the sender and receiver is chosen from a group comprising group 5 eligibility, group enrollment, enrollment changes, formulary lookup, e-commerce integration, access from health plan web site or direct access via URL, personalized content integration, both context-specific and on demand, e-commerce integration and health care-related product awareness and buying capabilities, wherein the receiver is an employer.

10 17. The system of Claim 12, wherein the normalized data exchanged between the sender and receiver is chosen from a group comprising identification card requests, address changes, provider directory inquiries, personalized health information based on an interest profile, diagnosis information, relevant articles and patient education materials, communications from health care 15 providers and health care plans, lab and radiology results, scheduled appointments with a health care provider, prescription refills, personal health records, eligibility/benefit information, claim information, referral and authorization information and status, provider lookup, family history, medication profile and formulary lookup, wherein the receiver is a patient.

20 18. A system of normalizing health care data for transfer between an insurer and a participant, the system comprising:

an insurer system configured to maintain at least one database comprising the health care data;

25 an intermediary system operatively connected to the insurer system and to the database;

wherein the intermediary system is configured to extract the health care data from the database of the insurer system, and store the health care data in a staging database as extracted data;

30 a rules engine configured to receive the extracted data and normalize same to a predefined format, said rules engine defines each field of the extracted data and converts each field to a corresponding field in the predefined format, creating

normalized data, said rules engine also defines how the normalized data should relate to each other pursuant to predetermined instructions; and

a participant system in operable communication with the intermediary system;

5 wherein the participant system is configured to receive the normalized data subject to the rules engine.

19. The system of Claim 18, wherein the at least one database is a plurality of databases, wherein the intermediary system is operatively connected to the plurality of databases.

10 20. The system of Claim 18, wherein the participant system transmits a request that is sent to the intermediary system that determines which health care data is to be extracted and normalized in order to respond to the request.

15 21. The system of Claim 20, wherein the participant system transmits the request and the intermediary system transmits the normalized data over the internet.

22. The system of Claim 18, wherein the intermediary system comprises an error data system that removes extracted data identified as invalid when the extracted data is normalized.

23. The system of Claim 22, wherein the extracted data identified as invalid is corrected and reintroduced and is normalized.

24. The system of Claim 18, wherein the intermediary system comprises an audit database to track activity of the intermediary system.

25 25. The system of Claim 20, wherein the rules engine defines the relationships among the normalized data pursuant to predetermined instructions to determine a response to the request.

26. A system of health care management of medical testing administration between an insurer, a medical laboratory and at least one health care participant, the system comprising:

30 a participant computer at which a medical test request is made pursuant to a first predefined format;

an insurer processing system that is operatively coupled to the participant's computer, and through which the medical request is transferred;

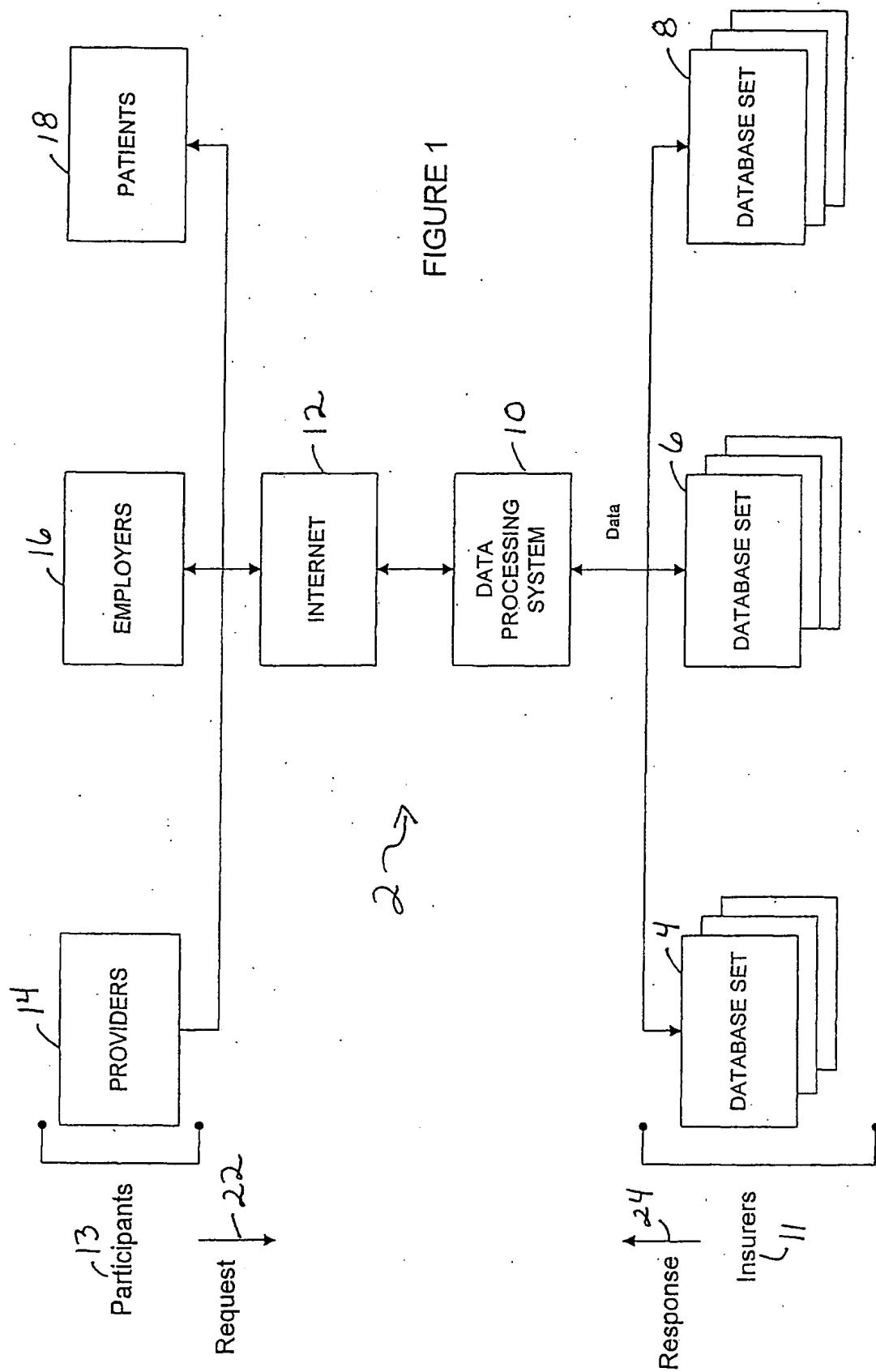
wherein the processing system is operatively coupled to a rules database to approve the medical test request pursuant to predetermined criteria; and a laboratory computer operatively coupled to the processing system and receives the medical test request if approved by the rules engine;

5 wherein results of a medical test are transmitted from the laboratory computer to the processing system where the results are transmitted to an insurer computer operatively coupled to the laboratory computer and to participant's computer.

27. The system of Claim 26, wherein the processing system
10 converts the results of the medical test to a second predefined format readable by a database stored on the insurer computer.

28. The system of Claim 26, wherein the at least one health care participant is chosen from a group comprising from a health care provider, an employer, and a patient.

15 29. The system of Claim 26, wherein the medical test request and the results of the medical test is transmitted through the internet.



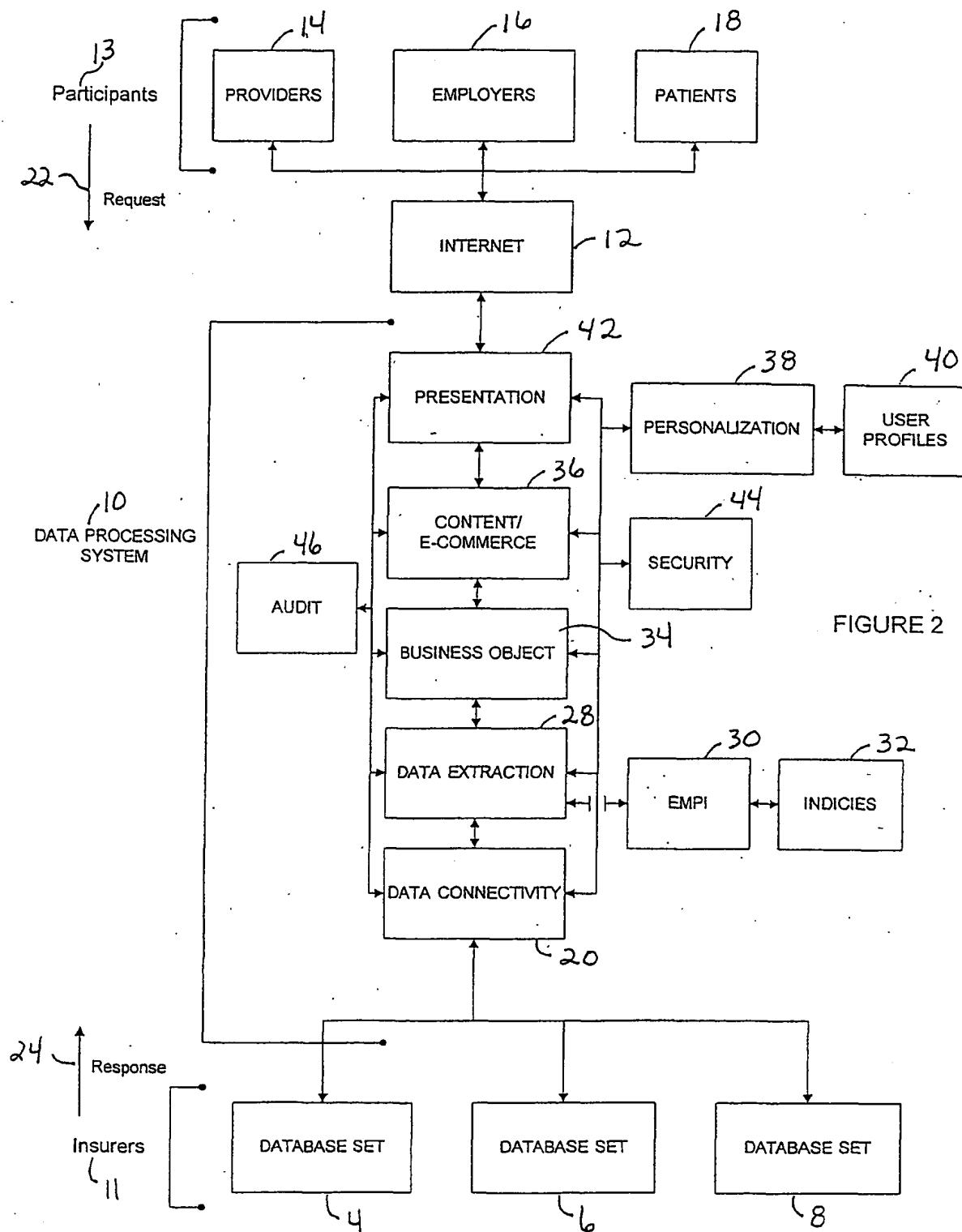


FIGURE 2

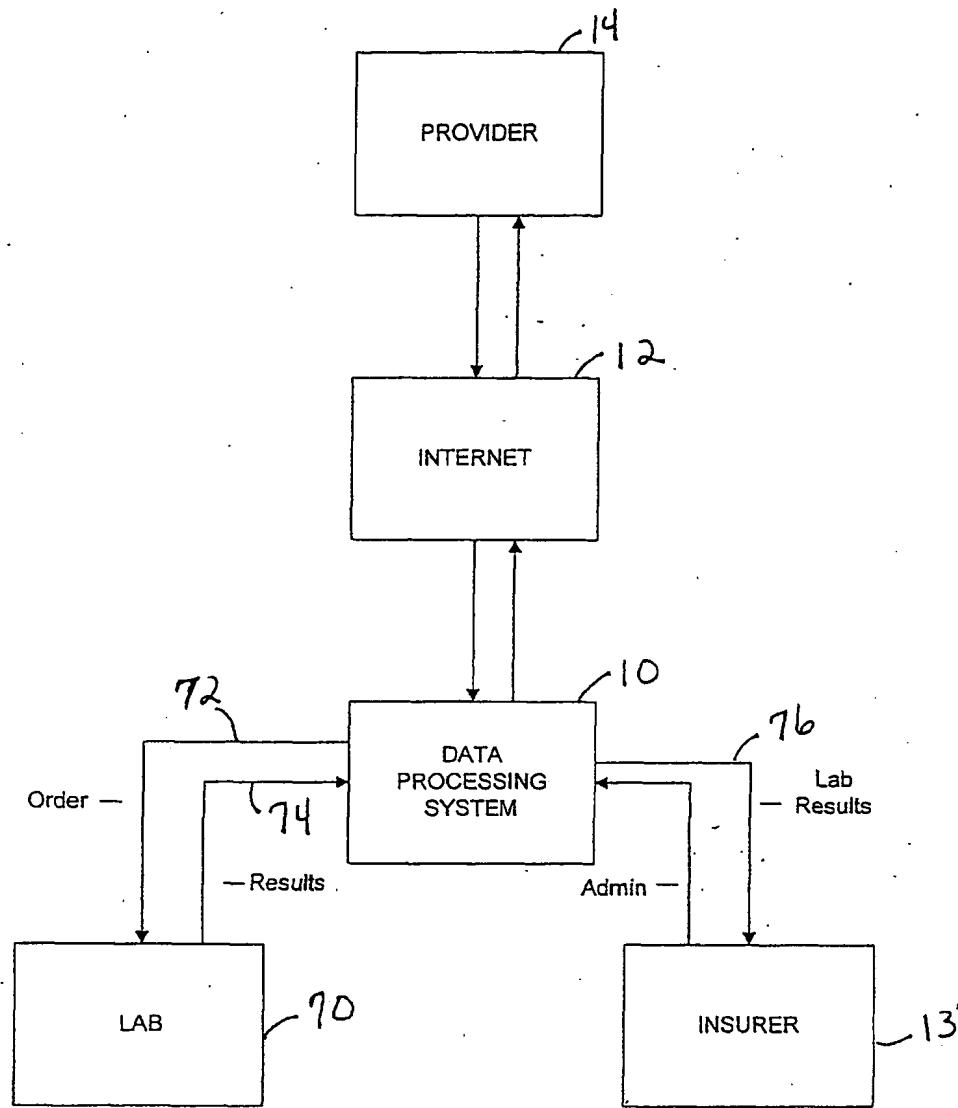


FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/42618

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/60
US CL : 705/2,3,4

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 705/2,3,4

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Proquest: humana, emphesys, patient medical record access

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	Lewis, D., Managed-Care Firm Takes Lead With Diverse Extranet, Internetweek, 21 May 2001, Issue 862, page 50.	1-29
Y	US 6,088,677 A (Spurgeon) 11 July 2000 (11.07.2000), abstract; figures 1-4; column 5, line 67 to col. 11, line 27.	1-29
Y	US 6,032,119 A (Brown et al) 29 February 2000 (29.02.2000), abstract; figures 1-3, and 4a-4e; column 1, line 10 - column 7, line 39.	1-29
Y	US 6,012,035 A (Freeman, Jr. et al) 04 January 2000 (04.01.2000), abstract; figures 1-4; column 2, line 7 to column 10 line 25.	1-29
Y	WO 00/26823 A1 (GARFINKLE LIMITED PARTNERSHIP II) 11 May 2000 (11.05.00), abstract; page 3, line 1 to page 7, line 22.	1-29
Y	US 6,076,166 A (Moshfeghi et al) 13 June 2000 (13.06.2000), abstract; column 1, line 4 to column 7 line 36.	1-29

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

11 January 2002 (11.01.2002)

Date of mailing of the international search report

29 JAN 2002

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